

# PROSTHESIS

## COMPLETE DENTURE



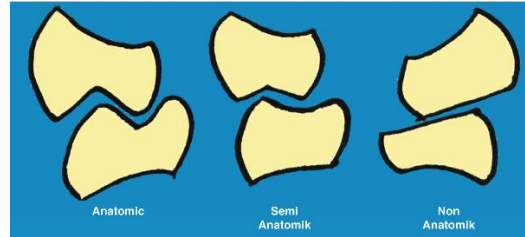
Lec.12 Occlusion of  
complete dentures

Part 2

DR. Zeena Farhan

## ◆ Types of posterior teeth according to their occlusal morphology

1. Semi-anatomic
2. Non-anatomic
3. Anatomic teeth



### 1. Anatomic teeth

- ✓ cuspal inclination of 30 degrees or more
- ✓ duplicate the masticatory surfaces of natural teeth (some dentist feel that natural occlusal forms are most efficient)
- ✓ usually used in balanced occlusion, teeth on both sides of the arch should be in contact when the jaw makes excursive movements
- ✓ indicated if opposing is natural teeth

### 2. Semi-anatomic teeth

- ✓ hybrid between anatomic and non- anatomic teeth(20 degree teeth)
- ✓ have low cusps and moderate in esthetic or mastication
- ✓ Some are arranged as anatomical teeth, others are arranged like non-anatomic

### 3. Non-anatomic teeth/flat/cuspless/monoplane teeth

- ✓ without cuspal prominence on the occlusal surface
- ✓ occlusal surfaces are not anatomically formed, but shaped according to mechanical principles rather than esthetic view
- ✓ has flat occlusal plane present
- ✓ used when not believe in balanced occlusion
- ✓ Transmit less destructive force to the tissues. An example of non-anatomical artificial teeth is Rational teeth



## Factors for consideration when choosing artificial posterior teeth/occlusal scheme are:

1. Ridge morphology with severe ridge resorption so use flat teeth
2. Arch relationship class II, I, 111 use flat teeth
3. Interridge distance increase interarch space, mean residual ridge resorption so use flat teeth, but not exceed 2/3 retro molar pad
4. Esthetics from esthetic view so anatomic teeth are more esthetic
5. Patient's age and neuromuscular coordination increase age and poor neuromuscular control so use flat teeth
6. Previous denture-wearing experience.
  - ✓ With severe resorption patterns so compromised stability Use of anatomic artificial teeth in such situations may not provide the advantages normally expected. If balanced occlusion with use of non-anatomic (0-degree) will be favorable.

## Concepts of occlusion

Although investigation have not proved any occlusal scheme is superior in function, safe to supporting tissue so the ultimate goal of denture occlusion is promoting denture stability, and direct forces vertically

## Balance occlusion

- Def .....
- Balance in complete denture is unique and man-made, it doesn't occur in natural teeth
- Purpose of its use is to provide stabilization forces to denture bases in centric and eccentric relation
- Enter bolus exit balance where occlusal balance is impossible to be present during mastication ,but present at swallowing ,speaking ,end of mastication and forces directed on wide area of the ridge compared to non-balanced occlusion which reduce area of tissues where forces directed to tissues causing more severe inflammation and ridge resorption

- At moment of exit balance so lever balance give stability so lever balance present in all types of denture ,but occlusal balance not present in all types of denture

### **Balanced articulation**

Def .....

### **◆ Advantages e of balanced articulation/occlusion**

1. Distribute occlusal forces over wide area of the tissues
2. Reduce trauma to oral tissues, minimize stress concentration by multiple point of contact to distribute functional stresses
3. Denture stability is improved
4. Masticatory efficiency is improved
5. Reduce chair side time require to fit denture

### **• Law of articulation for balanced occlusion**

**Supplied by hanaue and called hanaue quint**

1. Basic factors are
2. Condylar inclination
3. Incisal guidance
4. Compensatory curves
5. Plane of orientation (occlusal plane orientation)
6. Cusp inclination or angulation

**Condylar guidance \* incisal guidance = occlusal plan \* compensatory curves  
\* cusp heig**

### **A-Condylar path/guidance**

- ✓ This factor is fixed for each patient, out of control

**Def:** path traveled by the mandibular condyle in the temporomandibular joint, from glenoid fossa to articular eminence

✓ **Condylar angle :** angle between condylar path and an acceptable horizontal plane

❖ **Types of condylar path /angles**

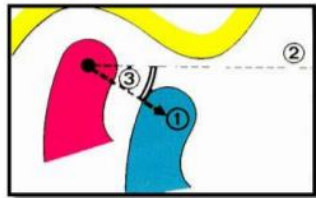
➤ **Sagittal/protrusive/horizontal condylar path**

- ✓ path travelled by mandibular condyle during protrusion ,where translate down ward forward to articular eminence
- ✓ As the mandible moves forward, the teeth separate posteriorly, due to the slope of the fossae. This separation is "Christensen's phenomenon"

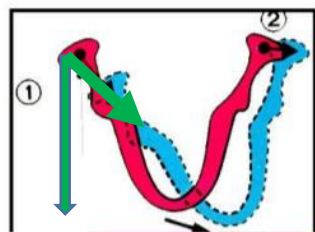
**Sagittal/protrusive/horizontal condylar angle**

- ✓ Angle between sagittal condylar path and horizontal plane
- ✓ its value depend on anatomy of glenoid fossa and condyle where with deep glenoid fossa /prominent articular eminence/more convexity of condyle lead to steep sagittal condylar path and large angle
- ✓ Can record this angle by protrusive record by ask patient to move protrusion 5:6mm (edge to edge)so space appear posteriorly "christensen's phenomena"(triangular space) so apply wax within it which is protrusive record

A- Sagittal ( HORIZONTAL) condylar path angle



B- Lateral condylar path angle



➤ **Lateral condylar path**

- ✓ Path travelled by mandibular condyle when move laterally where at non-working side translate down ward ,forward ,medial
- ✓ Space appear at non-working side (balanced side)

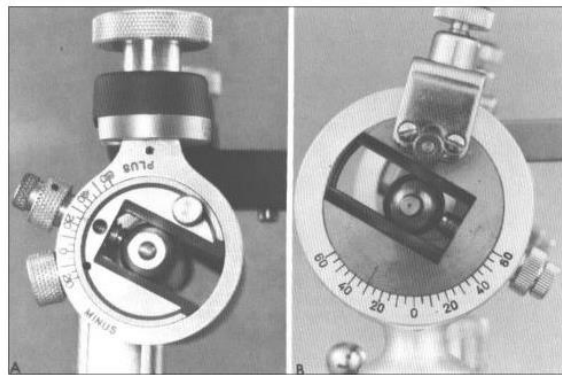
**Lateral condylar angle**

- ✓ Angle between lateral condylar path and sagittal plane
- ✓ its value depend on anatomy of glenoid fossa and condyle where with deep glenoid fossa /prominent articular eminence/more convexity of condyle lead to steep lateral condylar path and large angle
- ✓ Can record this angle by lateral record by ask patient to move laterally so space appear between upper and lower record block at balanced side then apply wax in this space to be lateral record(2 lateral records right and left)

### At articulator

#### Condylar guidance

Mechanical device on an articulator, to produce similar paths of condyles in the temporomandibular joints



#### Condylar guidance inclination

The angle of inclination that the condylar guidance (ball) makes with an acceptable horizontal plane, and is measured in degrees

##### ◆ **Horizontal condylar guidance**

- ✓ Horizontal condylar guidance is transferred to the articulator by means of a protrusive record
- ✓ Protrusive interocclusal records obtained after setting of anterior teeth using esthetic and phonetic guidelines, **or** on the posterior teeth at the try-in appointment **or** five to six millimeters of protrusion will produce protrusive record posteriorly

##### ◆ **Lateral condylar guidance**

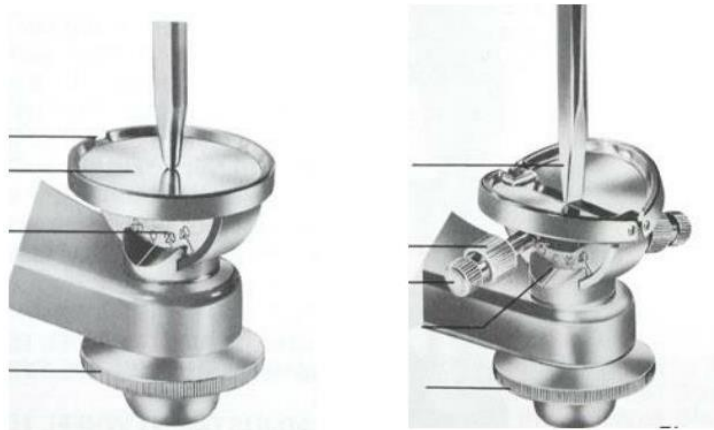
- ✓ Transferred to articulator by lateral records

On a semi-adjustable articulator

- Horizontal condylar guidance detected by protrusive record
- Lateral condylar guidance detected by hanaue formula /equation ((L=H/8 +12))

### B-Incisal guidance

- ✓ At articulator consist of incisal post and incisal table which adjusted by screw.



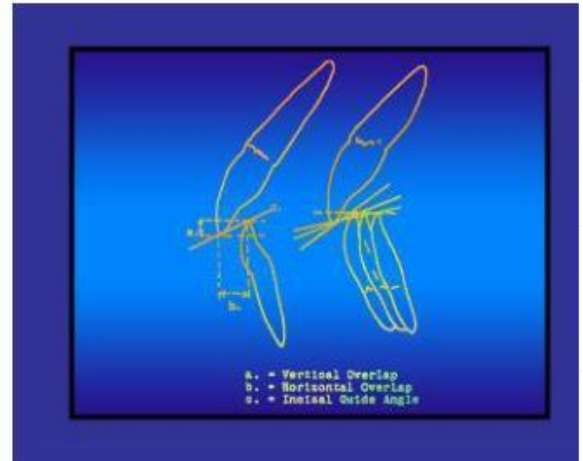
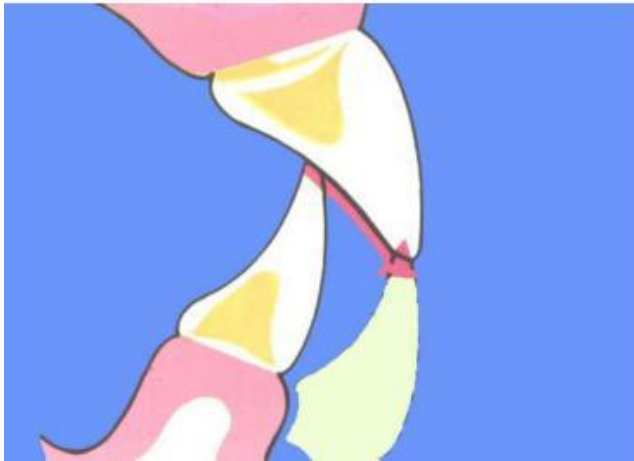
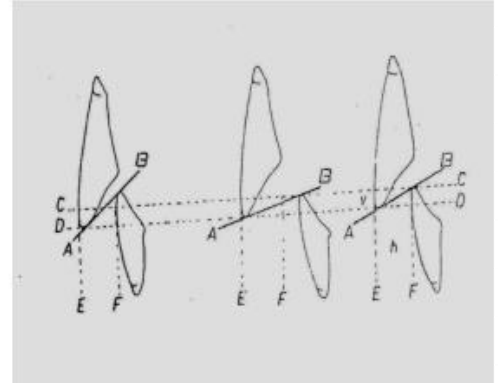
- ✓ inclination of incisal table affected by incisal path /angle which developed between artificial teeth anteriorly where setted according to esthetic ,phonetic guidelines incisal path /angle affected by horizontal overlap ,vertical over lap
- ✓ (with greater horizontal overlap "overjet" decrease incisal angle) (with greater vertical overlap "overbit"so increase incisal angle)
- ◆ The greater the vertical overlap and the smaller the horizontal overjet, the greater the incisal guidance will be, therefore, a steeper cusp height would be necessary to achieve a balanced occlusion
- ◆ The smaller the vertical overlap and the greater the horizontal overjet,, the less need for a steeper cusp height to achieve a balanced occlusion
- ✓ under control of the dentist
- ✓ For complete dentures the incisal guide table should be as flat and nearly parallel to the occlusal plane as esthetics and phonetics will permit, thus creating a small incisal guide angle and low cusp angulation
- ✓ The right and left condylar guidance and incisal guidance are the end/limiting controlling factors for articulator movement/balanced occlusion



- ✓ When the occlusal surfaces of the teeth make eccentric contact during function, the cusps and incisal edges sliding to each other where incisal post touch table during movement

#### The Incisal Path .

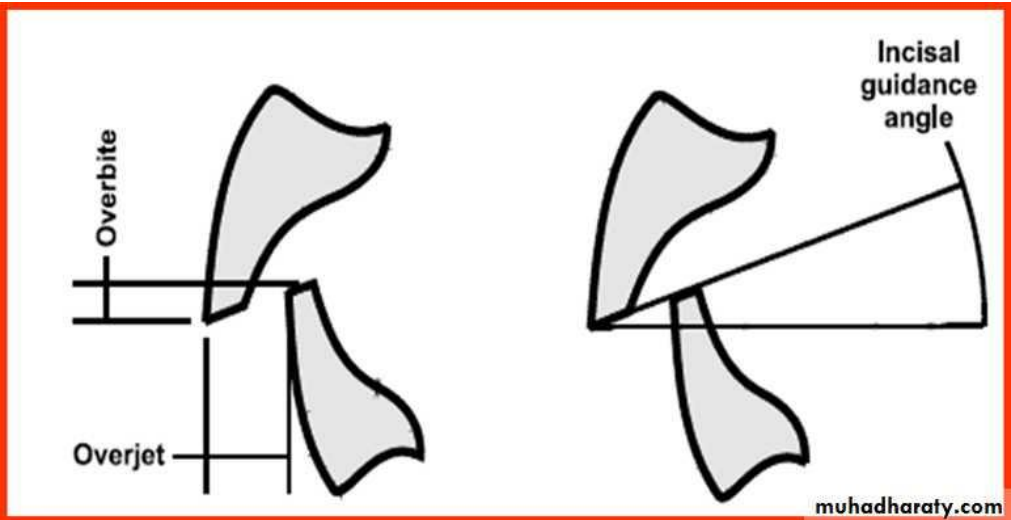
- The Incisal Path Angle .
- Vertical Overlap (overbite)
- Horizontal overlap
- The greater the amount of vertical overlap
- The greater the incisal angle
- The greater the amount of horizontal overlap
- The lesser the incisal angle



#### NOTES

- ✓ **Incisal path**  
Path travelled by mandibular anterior teeth at palatal surface of maxillary anterior teeth till edge to edge
- ✓ **Sagittal incisal guide angle**  
angle formed with the horizontal plane by drawing a line in the sagittal plane between the incisal edges of the maxillary and mandibular central incisors when the teeth are in centric occlusion
- ✓ **Incisal guidance**  
part of an articulator which maintains the incisal guide angle





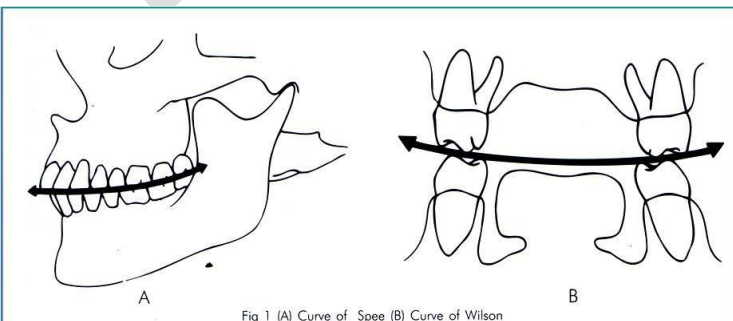
### C-Compensating Curves

- ◆ Compensating curves are the anteroposterior and medio lateral curvature during arrangement of artificial teeth which is used to develop balanced occlusion
- ✓ The anteroposterior curve is useful in creating balance in protrusive excursions
- ✓ the cross-arch curve/mediolateral curve is useful for balance in lateral movements
- ◆ The anatomic curvatures

#### 1. Curve of Spee

- ✓ Begin at the tip of the lower canine and following the buccal cusps of the premolars and molars, continuing to the anterior border of the ramus
- ✓ Anteroposterior curve

Compensating curve is developed in the artificial teeth in a balanced occlusion to compensate for drop in the posterior part of the mandible when the jaw is moved in protrusion and causes the posterior teeth or occlusion rims to separate in the posterior



## 2. Curve of Wilson

- ✓ a curve in buccolingual direction with the buccal surfaces of the lower posterior teeth higher than the lingual, concavity is directed upward
- ✓ medio lateral curvature

Is a compensating curve in artificial teeth in balanced occlusion to compensate drop on the non-working side (condyle moves downward, forward, and medially on the articular eminence) so teeth contact in this side

- ◆ The form of the compensating curves is **entirely under the control of the dentist**, done by inclining the long axes of the teeth
- ◆ compensatory curves in the most deepest area not exceed 1.5mm

## D-Plane of Orientation

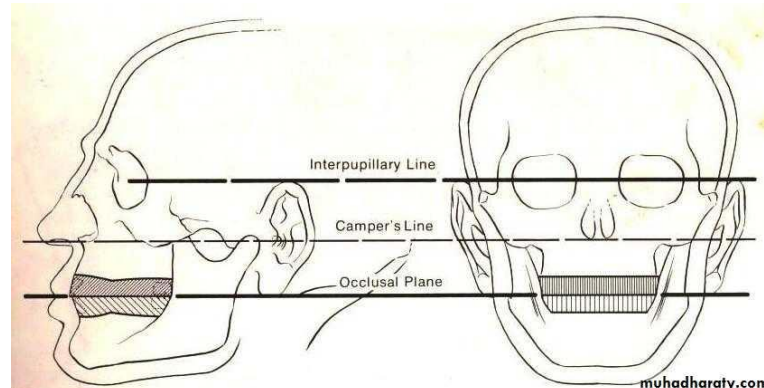
- ✓ An imaginary surface touches the incisal edges of the incisors and the tips of the occluding surfaces of the posterior teeth.
- ✓ It is not true plane, but represents the mean curvature of the surface anteriorly determined according to esthetic, phonetic requirements

**Upper** parallel to interpupillary line

**Lower** with angle of mouth

**Posteriorly** determined for stability of lower denture where one-half and not exceed 2/3 the height of the retromolar pads

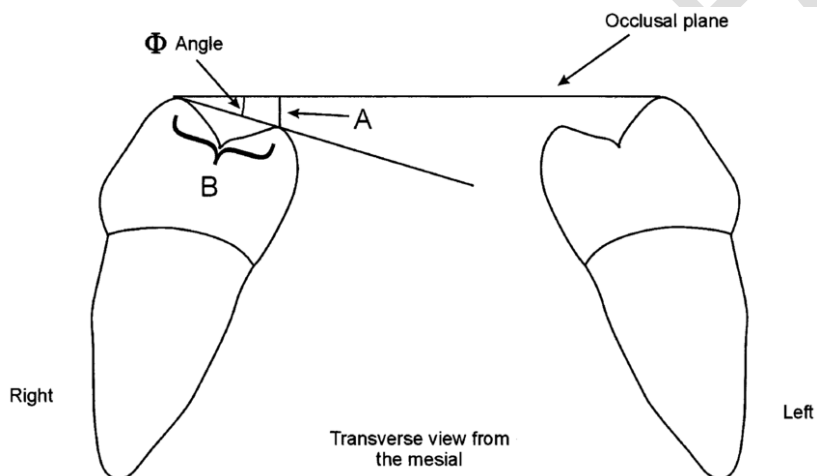
- ◆ Sears recommended that the occlusal plane be placed closer to the weaker alveolar ridge without acting as an inclined plane to enhance the stability of the mandibular denture
- ◆ For accurate location of occlusal plane on articulator ,third point of reference during the face-bow transfer procedure should be used
- ◆ inclination, slope of occlusal plane not exceed 10°



## E-Cusp angulation or inclination Cusp angle

- ✓ The angle made by slopes of a cusp with base of cusp /horizontal plane
- ✓ The angle made by the slopes of a cusp with base of cusp where line bisecting the cusp is perpendicular to base of cusp
- ✓ **Cusp height**  
The shortest distance between the tip of cusp and its base
- ✓ **Effective cusp angle** cusp angle +degree of inclination of tooth "which is included in equation"
- ✓ On the articulator, the first molar is approximately equidistant from each end controlling factors, the condylar guidance and the incisal guidance. So the cusp height needed to achieve balance in lateral and protrusive excursion

The condylar guidance be 30, incisal guidance 10 so cusp height  $(10^\circ + 30^\circ = 40^\circ / 2 = 20^\circ$



- ✓ Condylar inclination can't be altered, out of our control all four factors under dentist control
- ✓ For example increase condylar inclination require increase cusp height ,increase compensatory curves ,reduction in incisal guidance
- ✓ Incisal guidance should be kept flat for esthetic ,phonetic
- ✓ Occlusal plane orientation is the least important guidance for balanced occlusion Increasing cusp height require decrease in compensatory curves and increase in incisal guidance

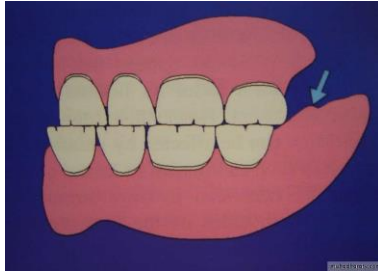
◆ **Step by step for balanced occlusion on semiadjustable articulator**

- 1- Determine vertical and horizontal relation
- 2- Mount upper cast by maxillary face bow
- 3- Mount lower cast by interocclusal record
- 4- During mounting, all angles (incisal guidance, condylar guidance) are zero
- 5- Apply upper and lower record block in patient mouth and make protrusive record by .....
- 6- Apply protrusive record on articulator where free movement of condylar guidance and adjust sagittal condylar guidance, then calculate lateral condylar guidance from equation ( $L=H/8 +12$ )
- 7- set upper and lower anterior teeth with need to decrease incisal angle to decrease incisal guidance to avoid increase in compensatory curves and cusp height and check in patient mouth to evaluate esthetic and phonetic
- 8- At the end when move articulator in protrusion condylar element move, anterior teeth sliding and incisal post touch table
- 9- Set posterior teeth in centric then move articulator protrusion and adjust them to be contact
- 10- Move articulator laterally and adjust teeth to be contact in lateral

**Arranging Non-anatomic (Zero Degree, Cuspless) Teeth For Balanced Occlusion**

Balanced occlusion for non-anatomic teeth may be accomplished by:

1. Arranging teeth in compensating curve (anteroposterior and lateral curves)  
(Functionally generated path)
2. Tilting the second molars to create an inclined plane
3. Placing "balancing ramps" behind the lower second molars



### **1. Arranging teeth in a compensating curve produced in plaster and pumice**

- ✓ Non-anatomic teeth set with a compensating curve to provide some degree of protrusive and lateral balance
- ✓ Buccal cusps are set higher than the lingual cusps and the distal cusps are set higher than the mesial cusps Thus, both anteroposterior and side to side curvatures are created leading to "three- point balance"
- ✓ Proper arrangement is somewhat easier to achieve because opposing teeth meet flat surface to flat surface.

### **2. Placing balancing ramps behind the second molars**

- ✓ Sears advocated a balancing ramp to obtain bilateral balance where all teeth are arranged on a monoplane occlusal scheme, a wax ramp is formed behind the mandibular second molar
- ✓ The articulator is moved into various excursions, allowing the maxillary second molar to carve the proper contours into the ramp

(It is usually better to over wax the ramp slightly prior to processing, to be adjusted well)

(It can be equilibrated at the denture placement appointment after the patient remount procedure has been completed).

### **3. Tilting the second Molars to create an inclined plane**

- ✓ All teeth except the second molars are arranged in a monoplane occlusal scheme. The second molars are set to produce compensating curve

- ✓ the occlusal surfaces of the mandibular second molars face slightly to the mesial and lingual while the occlusal surfaces of the maxillary second molars face somewhat to the distal and buccal
- ✓ The degree of inclination necessary for achieving posterior balance is determined by the end-controlling factors, incisal guidance and condylar guidance. When a patient moves in protrusive or working position, the tilted molar will make contact with opposing

### **Neurocentric occlusion**

#### ➤ Characters of neurocentric occlusion

1. The antero posterior plane should be parallel to the underlying ridges and midway between them, so directs the forces perpendicular to the ridge
2. There is no compensating curve in both anteroposterior and mediolateral directions
3. The neurocentric occlusion considered that the balance in eccentric position is unnecessary because inclines of cusps cause more lateral forces so reduce stability of denture
4. Depend on two keys neutralization of inclines centralization of forces on denture foundation
5. Reduce size of teeth (buccolingual) and number of teeth (use 6 posterior teeth instead of 8 teeth, eliminate 2nd molar)
6. Incisal guidance adjusted at zero
7. Cuspless teeth are setted over crest or slightly lingual
8. Patient is instructed to void incision on anterior teeth
9. Lateral condylar guidance and horizontal condylar guidance adjusted at zero so articulator can only open and close
10. Avoid set teeth over ridge incline as retromolar pad

*Q This concept depend on mechanical theory (make mastication with preserving supporting structure), not related to esthetic*

*Q it is type of non-balanced occlusion*



### ➤ **Aduantages**

1. Technique is simple and require less record
2. Removing cusp inclines so reduce lateral forces which are more destructed to ridge compared to anatomic teeth
3. Teeth are easier to adjust
4. Provide area of closure not hold mandible in single position (cusp to fossa), so will be ideal with geriatric patient with limited oral dexterity
5. Good for class class II.III and cross bite which mostly present with ridge resorption in geriatric patient
6. If neutrocentric occlusion is good with poor ridge so it will good with well-developed ridge

### ➤ **Disadvantages**

1. Least esthetic of all occlusal scheme
2. If set teeth more lingual so not compatible with tongue or cheeks
3. Flat nature of teeth impair mastication due to poor bolus penetration and patient feel dull to make grinding or crushing and exert more force
4. Incisal guidance and condylar guidance are zero so require only mastication at centric relation and patient will learn and maintain jaw at it



5. So can be used in class I .II .III but sever class II will have problem as mandible tend to move eccentric to masticate

6. difficult to be balanced

➤ **indications**

1. used with flat ridge
2. Class 11,111 arch relation ship
3. Maxillofacial prosthesis
4. set teeth in cross bite
5. Patient with Parkinsonism disease (poor neuromuscular control)

➤ **Elements of neutrocentric occlusion**

1. Position of posterior teeth on crest to verticalize forces
2. Use narrow teeth buccolingual by 40% to decrease stresses
3. Decrease number instead of 8 teeth use 6 posterior teeth
4. Use flat teeth has no cusp inclines

➤ **There are five factors in neutrocentric occlusion**

1. Position

Positioning of teeth over crest or slight lingual so forces will be within crest of the ridge

2. Proportion

Reduction in width of teeth by 40 percentage by narrowing teeth, this reduce and centralize forces, and decrease horizontal forces where decrease friction between opposing teeth

3. Pitch

Placing occlusal plane parallel to underlying tissues and midway between upper and lower ridges so forces directed vertically to underlying ridges

No compensatory curves, zero incisal guidance so instruct not to incise

4. Form

Flat teeth with no cusp incline and no projections so contact between upper and lower in single plane so reduce lateral forces and keep masticatory forces over crest of the ridges

#### 5. Number

Posterior teeth reduced to 6 instead of 8 teeth so decrease magnitude of forces applied and more centralized at 2<sup>nd</sup> premolar and 1<sup>st</sup> molar

#### ➤ **Lingualized occlusion.**

Concept of occlusion where maxillary palatal cusps which are centric holding cusps against mandibular zero degree or shallow cusps also maxillary buccal cusps are shallow and away from occlusion done by

1. Reduction of buccal cusps of upper
2. Slight rotation of teeth

*ϕ May be balanced or non-balanced*

1. Balanced if maxillary posterior teeth with sharply pointed lingual cusp oppose to mandibular teeth with shallow incline
2. Non balanced if maxillary posterior teeth with sharply pointed lingual cusp oppose to mandibular monoplane teeth "similar to linear occlusion"

*ϕ It is an attempt to*

1. Maintain esthetic and penetration of food by maxillary anatomic teeth
2. Maintain freedom of movement by mandibular flat teeth or shallow cusps and maxillary buccal cusps are shallower

#### ➤ **Indication for lingualized occlusion**

Balanced lingualized occlusion used with patient with high priority of esthetic while non-balanced lingualized occlusion indicated in

1. Sever ridge resorption
2. Displaceable tissue (flabby)
3. Class 1,111 jaw relation

4. When complete denture oppose RPD or over denture
5. Parafunctional habits (bruxism -clenching)

➤ **Advantages**

1. Advantage related to anatomic and non-anatomic teeth anatomic teeth is more esthetic than non-anatomic anatomic teeth has good penetration to food bolus free of movement due to non-anatomic teeth
2. Verticalization of forces are centralized over lower teeth
3. Create only one point of contact (mortar and pestle) so small area of contact so more efficient and control lateral forces
4. Lingualized occlusion used with all morphologic ridge contour
5. Buccalization mean buccal cusps allow more escape way of food so reduce forces over supporting tissues
6. Increase stability of denture as decrease locking of cusps ((*lingualized occlusion truly is an occlusion of all seasons*))

N.B

- Linear occlusion one dimension where lower teeth has sharp blade to occlude in center of upper flat teeth(has length)
- 2dimension Neutrocentric occlusion(has width ,length)
- 3dimension where cusps are present with anatomic or semi anatomic teeth(has width ,length ,depth)